

Research Paper :

Performance evaluation of tractor operated manure spreader

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ABSTRACT

Organic manure is considered as the eco-friendly bio-fertilizer for the highly polluted modern era. Proper application of manure to the land is essential to prevent pollution of land, ground and surface water and to prevent loosing of ammonia and other nutrients from the manure. Timely application of manure in accordance with the nutrient requirements of the crops will result in improved crop production. A manure spreader was attached to the 45 HP tractors through the hitch point and test was conducted. The 540 \pm rpm PTO speed was used to operate the rotary blades of manure spreader. The distribution pattern of farm yard manure was uniformly spread over the area and little variation was found. This was due to clods in to manure. It showed that there was saving of 94 per cent in time as compared to traditional method. The field capacity of the manure spreader was also worked out in terms of area coverage per hour. The actual average swath width of manure spreader was found 7.6 m but the effective swath was taken as 7.4 m by considering the overlap uniformity of application and spread pattern. The manure spreader was operated in two different fields. The theoretical field capacity of a tractor operated manure spreader was found to be 1.950 and 2.06 and average actual field capacity of the tractor operated manure spreader was found to be 1.395 and 1.473 at forward speed of 2.438 km/h. The average field efficiency of the tractor operated manure spreader was found to be 71.55 per cent. The field application rate of farm yard manure was observed to be 5.435 and 5.89 t per ha. The cost economics of the manure was analyzed. The cost of spreading with the tractor operated manure spreader was Rs. 247 per ha. The saving in cost and time were 72 and 94 per cent, respectively as compared to conventional method of manual broadcasting.

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Organic manure is considered as the eco-friendly bio-fertilizer for the highly polluted modern era. Proper application of manure to the land is essential to prevent pollution of land, ground and surface water and to prevent loss of ammonia and other nutrients from the manure. Timely application of manure in accordance with the nutrient requirements of the crops resulted in improved crop production. The important parameters to be considered while spreading the manure on the field are:

Restrict manure spreading on the land to the growing season of the crop, do not apply manure on the land when there is no crop.

Balance the quantity of manure with the nutrient requirements of the crop. The quantity of manure which is to be applied per ha depends on the soil type and should be limited not to manure but it should be equivalent of 150 kg N per hectare.

Evaporation of ammonia and greenhouse gases should be reduced when manure is not or only for a short time exposed to fresh air. The manure should be covered with soil (e.g. harrowing) immediately after spreading or should be injected into the soil directly.

Millions of tones of organic solid waste are produced

every year in India and the land application of these solid waste has become a popular method of disposing them in an environmentally safe manner. Spread the manure manually in the field, which is laborious tedious, unfortunately there is no mechanical device commercially available in India to spread the solid organic manure uniformly in the field (Dhaliwal and Vinay, 2004).

METHODOLOGY

The manure spreader evaluated under present study is a tractor operated trailed implement (Fig.1)

Power transmission system of the machine:

The power for the manure spreader was transmitted from the tractor PTO. The drive from the PTO was transmitted to the jack shaft of the manure spreader. The main drive shaft transmits power to all other mechanisms. The power was transmitted to the main drive shaft through a chain drive. From the compound sprocket, drive was transmitted to both the upper and lower spreader drums and also to the beater through chain drive. The drive from the main drive shaft was transmitted to the tail gate drive mechanism through chain drives. For tail gate the drive